What is claimed is:

1. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

   (a) collecting a biological sample from an HIV-infected patient; and
   (b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codon 230 alone or in combination with a mutation at codon 103 or a mutation at codon 181,

   wherein the presence of such a mutation correlates with a decrease in non-nucleoside reverse transcriptase inhibitor susceptibility and drug-dependent stimulation of viral replication.

2. The method of claim 1, wherein the mutated codon 230 encodes a leucine (L).

3. The method of claim 1, wherein the mutated codon 103 encodes an asparagine (N).

4. The method of claim 1, wherein the HIV-infected patient is being treated with an antiretroviral agent.

5. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon 230 alone or in combination with a mutation at codon 103 or a mutation at codon 181 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the expression of the indicator gene in a target host cell; and

(d) comparing the measurement of the expression of the indicator gene from step (c) with the measurement of the expression of the indicator gene measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

6. A resistance test vector comprising:

(i) an HIV patient-derived segment which comprises reverse transcriptase having a mutation in at least one of codons 230, 103 or 181, and

(ii) and an indicator gene,

wherein the expression of the indicator gene is dependent upon the patient derived segment.

7. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codon 230 alone or in combination with at least one mutation at a codon selected from the group consisting of: codon 101, codon 103, codon 190, codon 221 and codon 238, wherein the presence of the mutations correlate with a decrease in non-nucleoside reverse transcriptase inhibitor susceptibility and drug-dependent stimulation of viral replication.

8. The method of claim 7, wherein the mutated codon 230 encodes a leucine (L).

9. The method of claim 7, wherein the mutated codon 101 encodes a glutamic acid (E), the mutated codon 103 encodes an asparagine (N), the mutated codon 190 encodes a serine (S), the mutated codon 221 encodes a tyrosine (Y), or the mutated codon 238 encodes a threonine (T).

10. The method of claim 7, wherein the HIV-infected patient is being treated with an antiretroviral agent.

11. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon 230 alone or in combination with a mutation at codon 103, codon 190, codon 221 or codon 238 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the expression of the indicator gene in a target host cell; and

(d) comparing the measurement of the expression of the indicator from step (c) with the measurement of the expression of the indicator gene measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

12. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 230, 101, 103, 190, 221, and/or 238 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

13. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codons 241 and 103 or 135 in which the presence of the mutations correlate with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

14. The method of claim 13, wherein the mutated codon 241 encodes a serine (S).

15. The method of claim 13, wherein the mutated codon 103 encodes an asparagine (N) and the mutated codon 135 encodes a threonine (T).

16. The method of claim 13, wherein the HIV-infected patient is being treated with an antiretroviral agent.

17. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon(s) 241 and 103 or 135 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

18. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 241, 103 and/or 135 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

19. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codons 241 and 101, 106 135, 138 or 190 in which the presence of the mutations correlate with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

20. The method of claim 19, wherein the mutated codon 241 encodes an isoleucine (I).

21. The method of claim 19, wherein the mutated codon 101 encodes a glutamic acid (E), the mutated codon 106 encodes a methionine (M), the mutated codon 135 encodes a threonine (T), the mutated codon 138 encodes an alanine (A) and/or the mutated codon 190 encodes an alanine (A).

22. The method of claim 19, wherein the HIV-infected patient is being treated with an antiretroviral agent.

23. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon(s) 241 and 101, 106, 135, 138 or 190 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

24. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 241, 101, 106, 135, 138 and/or 190 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

25. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codons 245 and 98, 135, and/or 181 in which the presence of the mutations correlate with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

26. The method of claim 25, wherein the mutated codon 245 encodes an glutamic acid (E).

27. The method of claim 25, wherein the mutated codon 98 encodes a glycine (G), the mutated codon 135 encodes a threonine (T), and/or the mutated codon 181 encodes a cysteine (C).

28. The method of claim 25, wherein the HIV-infected patient is being treated with an antiretroviral agent.

29. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon(s) 245 and 98, 135, and/or 181 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

30. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 245, 98, 135, and/or 181 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

31. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codons 245 and 101, 103, 135, and/or 190 in which the presence of the mutations correlate with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

32. The method of claim 31, wherein the mutated codon 245 encodes an glutamic acid (E).

33. The method of claim 31, wherein the mutated codon 101 encodes a glutamic acid (E),the mutated codon 103 encodes an asparagine (N), the mutated codon 135 encodes a threonine (T), and/or the mutated codon 190 encodes an alanine (A).

34. The method of claim 31, wherein the HIV-infected patient is being treated with an antiretroviral agent.

35. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon(s) 245 and 101, 103, 135, and/or 190 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

36. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 245, 101, 103, 135, and/or 190 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

37. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:
    (a) collecting a biological sample from an HIV-infected patient; and
    (b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codons 245 and 103, 225, and/or 270 in which the presence of the mutations correlate with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

38. The method of claim 37, wherein the mutated codon 245 encodes a glutamic acid (E).

39. The method of claim 37, wherein the mutated codon 103 encodes an asparagine (N), the mutated codon 225 encodes a histidine (H), and/or the mutated codon 270 encodes an methionine (M).

40. The method of claim 37, wherein the HIV-infected patient is being treated with an antiretroviral agent.

41. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:
    (a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon(s) 245 and 103, 225, and/or 270 and an indicator gene into a host cell;
    (b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

42. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 245, 103, 225, and/or 270 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

43. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codons 245 and 135, and/or 138 in which the presence of the mutations correlate with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

44. The method of claim 43, wherein the mutated codon 245 encodes a threonine (T).

45. The method of claim 43, wherein the mutated codon 135 encodes a threonine (T), and/or the mutated codon 138 encodes an glycine (G).

46. The method of claim 43, wherein the HIV-infected patient is being treated with an antiretroviral agent.

47. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon(s) 245 and 135, and/or 138 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

48. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 245, 135, and/or 138 and an indicator gene, wherein the expression of the indicator

gene is dependent upon the patient derived segment.

49. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codons 245 and 98, 103, 135, 181 and/or 190 in which the presence of the mutations correlate with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

50. The method of claim 49, wherein the mutated codon 245 encodes a threonine (T).

51. The method of claim 49, wherein the mutated codon 98 encodes a glutamic acid (G), the mutated codon 103 encodes an asparagine (N), the mutated codon 135 encodes a threonine (T), the mutated codon 181 encodes a cysteine (C), and/or the mutated codon 190 encodes an alanine (A).

52. The method of claim 49, wherein the HIV-infected patient is being treated with an antiretroviral agent.

53. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon(s) 245 and 98, 103, 135, 181,and/or 190 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and,

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

54. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 245, 98, 103, 135, 181, and/or 190 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

55. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codons 245 and 103 in which the presence of the mutations correlate with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

56. The method of claim 55, wherein the mutated codon 245 encodes a threonine (T).

57. The method of claim 55, wherein the mutated codon 103 encodes an asparagine (N).

58. The method of claim 55, wherein the HIV-infected patient is being treated with an antiretroviral agent.

59. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon(s) 245 and 103 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and,

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

60. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 245 and 103 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

61. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:
(a) collecting a biological sample from an HIV-infected patient; and
(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codons 245 and 103, 135 and/or 225 in which the presence of the mutations correlate with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

62. The method of claim 61, wherein the mutated codon 245 encodes a methionine (M).

63. The method of claim 61, wherein the mutated codon 103 encodes an asparagine (N), the mutated codon 135 encodes a threonine (T) and/or the mutated codon 225 encodes a histidine (H).

64. The method of claim 61, wherein the HIV-infected patient is being treated with an antiretroviral agent.

65. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon(s) 245 and 103, 135 and/or 225 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and,

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

66. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 245, 103, 135, and/or 225 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

67. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codons 270 and 103 and/or 135 in which the presence of the mutations correlate with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

68. The method of claim 67, wherein the mutated codon 270 encodes a serine (S).

69. The method of claim 67, wherein the mutated codon 103 encodes an asparagine (N) and/or the mutated codon 135 encodes a threonine (T).

70. The method of claim 67, wherein the HIV-infected patient is being treated with an antiretroviral agent.

71. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon(s) 270 and 103 and/or 135 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and,

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

72. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 270, 103, and/or 135 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

73. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codon 230 in which the presence of the mutation correlates with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

74. The method of claim 73, wherein the mutated codon 230 encodes a leucine (L).

75. The method of claim 73, wherein the HIV-infected patient is being treated with an antiretroviral agent.

76. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon 230 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and,

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

77. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutations at codons 230 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

78. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codon 241 in which the presence of the mutation correlates with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

79. The method of claim 78, wherein the mutated codon 241 encodes a serine (S).

80. The method of claim 78, wherein the HIV-infected patient is being treated with an antiretroviral agent.

81. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon 241 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and,

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

82. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutation at codon

241 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.

83. A method of assessing the effectiveness of non nucleoside reverse transcriptase antiretroviral therapy of an HIV-infected patient comprising:

(a) collecting a biological sample from an HIV-infected patient; and

(b) evaluating whether the biological sample comprises nucleic acid encoding HIV reverse transcriptase having a mutation at codon 270 in which the presence of the mutation correlates with a decrease in NNRTI susceptibility and drug-dependent stimulation of viral replication.

84. The method of claim 83, wherein the mutated codon 270 encodes a serine (S).

85. The method of claim 83, wherein the HIV-infected patient is being treated with an antiretroviral agent.

86. A method for assessing the biological effectiveness of a candidate HIV antiretroviral drug compound comprising:

(a) introducing a resistance test vector comprising a patient-derived segment further comprising a mutation at codon 270 and an indicator gene into a host cell;

(b) culturing the host cell from step (a);

(c) measuring the indicator in a target host cell; and,

(d) comparing the measurement of the indicator from step (c) with the measurement of the indicator measured when steps (a) - (c) are carried out in the absence of the candidate antiretroviral drug compound;

wherein a test concentration of the candidate antiretroviral drug compound is present at steps (a) - (c); at steps (b) - (c); or at step (c).

87. A resistance test vector comprising an HIV patient-derived segment further comprising reverse transcriptase having mutation at codon 270 and an indicator gene, wherein the expression of the indicator gene is dependent upon the patient derived segment.